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Patent

Attorney's Docket No. 029430-486

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of )  
Hisashi KAWANABE et al ) Group Art Unit: Unassigned  
Application No.: Unassigned ) Examiner: Unassigned  
Filed: September 24, 2001 )  
For: URETHANE RESIN COMPOSITION )  
FOR OPTOELECTRIC )  
CONVERSION ELEMENT SEALER )

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents  
Washington, D.C. 20231

Sir:

Prior to examination of the above-captioned patent application, kindly enter the following amendment.

IN THE SPECIFICATION:

Kindly replace the paragraph beginning at page 8, line 7, with the following:

Page 8, Paragraph Beginning at Line 7

< 12 > The composition described in < 5 > , wherein the compound having isocyanate groups is at least one compound selected from the group consisting of diisocyanatomethylbenzene, bis(l-isocyanato-1-methylethyl)benzene, 4,4'-diisocyanato-dicyclohexylmethane, 1-isocyanato-3,5,5-trimethyl-3-isocyanatomethylcyclohexane and bisisocyanatomethylcyclohexane.

Kindly replace the paragraph beginning at page 11, line 12, with the following:

<24> The method described in <22>, wherein the  
optoelectric conversion element is a light-emitting diode.

Kindly replace the paragraph beginning at page 14, line 6, with the following:

The above compound having isocyanate groups is most preferably at least one  
compound selected from the group consisting of diisocyanatomethylbenzene, bis(l-  
isocyanato-1-methylethyl)benzene, 4,4'-diisocyanato-dicyclohexylmethane, 1-isocyanato-  
3,5,5-trimethyl-3-isocyanatomethylcyclohexane and bisisocyanatomethylcyclohexane.

Kindly replace the paragraph bridging pages 21 and 22, with the following:

Illustrative examples of the isocyanate group-containing compound (i) having a  
structure in which the isocyanate groups are not directly bonded to the benzene ring  
include 1,3-di(isocyanatomethyl)benzene (m-XDI), 1,4-di(isocyanatomethyl)benzene (p-  
XDI), 1,3-bis(l-isocyanato-1-methylethyl)benzene (m-TMXDI), 1,4-bis(l-isocyanato-1-  
methylethyl)benzene(p-TMXDI), 1-isocyanatomethyl-3-(1-isocyanato-1-  
methylethyl)benzene, 1-isocyanatomethyl-4-(1-isocyanato-1-methylethyl)benzene and 1,4-  
di(isocyanatoethyl)benzene.

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Kindly replace the paragraph beginning at page 27, line 8, with the following:

Preferable out of these isocyanates are 1,3-di(isocyanatomethyl)benzene (m-XDI), 1,4-di(isocyanatomethyl)benzene (p-XDI), 1,3-bis(1-isocyanato-1-methylethyl)benzene (m-TMXDI), 1,4-bis(1-isocyanato-1-methylethyl)benzene (p-TMXDI), 4,4'-diisocyanato-dicyclohexylmethane (H12MDI), 1-isocyanato-3,5,5-trimethyl-3-isocyanatomethylcyclohexane (IPDI), 1,3-diisocyanatomethylcyclohexane (m-H6XDI), 1,4-diisocyanatomethylcyclohexane (p-H6XDI) and the polycyclic alicyclic isocyanate represented by the formula [I].

Kindly replace the paragraph bridging pages 30-32, with the following:

Specific examples of the polyhydric alcohols having a relatively low molecular weight include dihydric alcohols such as ethylene glycol (EG), diethylene glycol (DEG), propylene glycol (PG), dipropylene glycol (DPG), 1,3-butanediol (1,3-BD), 1,4-butanediol (1,4-BD), 2,2-dimethyl-1,3-propanediol (neopentyl glycol, NPG), 1,5-pentanediol, 1,6-hexanediol, 3-methyl-1,5-pentanediol, 2-methyl-2,4-pentanediol, 2-ethyl-1,3-hexanediol, and 1,3-dihydroxybenzene, 1,3-bis(2-hydroxyethoxy)benzene, 2,2-bis(4-hydroxyphenyl)propane, 4,4'-dihydroxydiphenylmethane, 1,2-dihydroxycyclohexane, 1,3-dihydroxycyclohexane, 1,4-dihydroxycyclohexane, 1,2-dihydroxymethylcyclohexane, 1,3-dihydroxymethylcyclohexane, 1,4-dihydroxymethylcyclohexane, 1,2-bishydroxyethoxycyclohexane, 1,3-bishydroxyethoxycyclohexane, 1,4-bishydroxyethoxycyclohexane, 1,2-bishydroxyethoxycarbonylcyclohexane, 1,3-bishydroxyethoxycarbonylcyclohexane, 1,4-bishydroxyethoxycarbonylcyclohexane, 2,5-

dihydroxymethylbicyclo[2.2.1]heptane, 2,6-dihydroxymethylbicyclo[2.2.1]heptane, 3,8-dihydroxymethyltricyclo[5.2.1.0<sup>2,6</sup>]decane, 3,9-dihydroxymethyltricyclo[5.2.1.0<sup>2,6</sup>]decane and 4,8-dihydroxymethyltricyclo[5.2.1.0<sup>2,6</sup>]decane; trihydric alcohols such as glycerine, 2-hydroxymethyl-2-methyl-1,3-propanediol, 2-ethyl-2-hydroxymethyl-1,3-propanediol (TMP), 1,2,5-hexanetriol, 1,2,6-hexanetriol, 1,2,3-cyclohexanetriol and 1,3,5-cyclohexanetriol; and tetrahydric or higher polyhydric alcohols such as pentaerythritol, glucose, sucrose, fructose, sorbitol, 1,2,3,4-cyclohexanetetrol, 1,2,4,5-cyclohexanetetrol, cyclohexanepentol (quercitol), cyclohexanehexol (inositol), and xylitol.

Kindly replace the paragraph bridging pages 35-36, with the following:

Specific examples of the polyhydric alcohols having a relatively low molecular weight include dihydric alcohols such as ethylene glycol (EG), diethylene glycol (DEG), propylene glycol (PG), dipropylene glycol (DPG), 1,3-butanediol (1,3-BD), 1,4-butanediol (1,4-BD), 2,2-dimethyl-1,3-propanediol (neopentyl glycol, NPG), 1,5-pentanediol, 1,6-hexanediol, 3-methyl-1,5-pentanediol, 2-methyl-2,4-pentanediol, 2-ethyl-1,3-hexanediol and 1,3-dihydroxybenzene, 1,3-bis(2hydroxyethoxy)benzene, 2,2-bis(4-hydroxyphenyl)propane, 4,4'-dihydroxydiphenylmethane, 1,2-dihydroxycyclohexane, 1,3-dihydroxycyclohexane, 1,4-dihydroxycyclohexane, 1,2-dihydroxymethylcyclohexane, 1,3-dihydroxymethylcyclohexane, 1,4-dihydroxymethylcyclohexane, 1,2-bishydroxyethoxycyclohexane, 1,3-bishydroxyethoxycyclohexane, 1,4-bishydroxyethoxycyclohexane, 1,2-bishydroxyethoxycarbonylcyclohexane, 1,3-bishydroxyethoxycarbonylcyclohexane, 1,4-bishydroxyethoxycarbonylcyclohexane, 2,5-

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dihydroxymethylbicyclo[2.2.1]heptane, 2,6-dihydroxymethylbicyclo[2.2.1]heptane, 3,8-dihydroxymethyltricyclo[5.2.1.0<sup>2,6</sup>]decane, 3,9-dihydroxymethyltricyclo[5.2.1.0<sup>2,6</sup>]decane and 4,8-dihydroxymethyltricyclo[5.2.1.0<sup>2,6</sup>]decane; trihydric alcohols such as glycerine, 2-hydroxymethyl-2-methyl-1,3-propanediol, 2-ethyl-2-hydroxymethyl-1,3-propanediol (TMP), 1,2,5-hexanetriol, 1,2,6-hexanetriol, 1,2,3-cyclohexanetriol and 1,3,5-cyclohexanetriol; and tetrahydric or higher polyhydric alcohols such as pentaerythritol, glucose, sucrose, fructose, sorbitol, 1,2,3,4-cyclohexanetetrol, 1,2,4,5-cyclohexanetetrol, cyclohexanepentol (quercitol), cyclohexanehexol (inositol), xylitol, dipentaerythritol and diglycerine.

Kindly replace the paragraph beginning at page 59, line 11, with the following:

100.0 Grams of NBDI was charged into a stainless cup. While the NBDI was stirred by stirrer, 62.3 g of a polyol (to be referred to as "polyol B" hereinafter) which is obtained by adding propylene oxide (to be referred to as "PO" hereinafter) to 1 mole of 2-ethyl-2-hydroxymethyl-1,3-propanediol (to be referred to as "TMP" hereinafter) and which has a hydroxyl value of 874 mgKOH/g and a residual potassium amount of 0.9 ppm was added to the NBDI without taking in bubbles, and they were stirred and mixed for 10 minutes to be dissolved homogeneously. The homogeneous solution was transferred into a mold having a size of 50 mm x 50 mm, allowed to react in an oven heated to 100°C in a nitrogen gas atmosphere for 5 hours and then after-cured at 150°C for 3 hours to obtain a colorless, transparent polyurethane resin.

**IN THE CLAIMS:**

Kindly replace claims 3, 4, 7-9, and 12-17, and add new claim 25 as follows.

3. (Amended) The resin according to claim 1, wherein the content of sulfur atoms is 500 ppm or less.
4. (Amended) The resin according to claim 1, wherein the content of alkali metal atoms is 10 ppm or less.
7. (Amended) The composition according to claim 5, wherein an initial mixing viscosity at the time of mixing the component (A) and the component (B) together at 20' C is in a range of 10 to 10,000 mPa·s.
8. (Amended) The composition according to claim 5, wherein a time required for a viscosity after mixing of the component (A) and the component (B) to become twice as much as the initial mixing viscosity is in a range of 2 to 20 hours.
9. (Amended) The composition according to claim 5, wherein the compound having isocyanate groups is a polycyclic alicyclic polyisocyanate or its modification.
12. (Amended) The composition according to claim 5, wherein the compound having isocyanate groups is at least one compound selected from the group consisting of diisocyanatomethylbenzene, bis(1-isocyanato-1,1-methylethyl)benzene, 4,4'-diisocyanato-

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dicyclohexylmethane, 1-isocyanato-3,5,5-trimethyl-3-isocyanatomethylcyclohexane and bisisocyanatomethylcyclohexane.

13. (Amended) The composition according to claim 5, wherein the compound having hydroxyl groups is a compound having at least two hydroxyl groups.

14. (Amended) The composition according to claim 13, wherein the content of alkali metal atoms in the compound having at least two hydroxyl groups is 10 ppm or less.

15. (Amended) The composition according to claim 5, which has a glass transition temperature of at least 75°C after cured.

16. (Amended) The composition according to claim 5, which has a refractive index of 1.45 to 1.80 as measured by using a D line from a helium light source after cured.

17. (Amended) The composition according to claim 5, which has a  $\Delta E$  of 1.5 or less as measured after irradiation for 600 hours by a sunshine weatherometer using a carbon arc lamp after cured,

a  $\Delta E$  of 1.5 or less after treating for 300 hours in a thermostatic chamber having a relative humidity of 90% and a temperature of 80°C,

a content of sulfur atoms of 500 ppm or less, and

a content of alkali metal atoms of 10 ppm or less.

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25. (New) The composition according to claim 12, wherein the content of alkali metal atoms in the compound having at least two hydroxyl groups is 10 ppm or less.

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REMARKS

By the instant Preliminary Amendment, various revisions have been made in the specification in order to properly identify certain compounds, provide more clear names and avoid the inclusion of the same compound more than one time. In addition, the claims have been amended so that all multiple dependency has been eliminated from the original claims and new dependent claim 25 has been added to encompass one aspect of the invention encompassed by the original multiple dependent claims. It is to be understood that the revisions to the claims are solely for formalistic purposes and not with regard to patentability and that applicants reserve the right to pursue claims directed to other aspects of the invention encompassed by the original multiple dependent claims or described in the specification.

Entry of the instant Preliminary Amendment and favorable consideration on the merits are respectfully requested.

Should the Examiner have any questions concerning the subject application, the Examiner is invited to contact the undersigned attorney at the number provided below.

Respectfully submitted,

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Date: September 24, 2001

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Page 8, Paragraph Beginning at Line 7

< 12 > The composition described in < 5 > , wherein the compound having isocyanate groups is at least one compound selected from the group consisting of diisocyanatomethylbenzene, [bis(1-isocyanato-1,1-dimethyl)benzene], bis(1-isocyanato-1-methylethyl)benzene, 4,4'-diisocyanato-dicyclohexylmethane, 1-isocyanato-3,5,5-trimethyl-3-isocyanatomethylcyclohexane and bisisocyanatomethylcyclohexane.

Page 11, Paragraph Beginning at Line 12

< 24 > The method described in [ < 23 > ] < 22 >, wherein the optoelectric conversion element is a light-emitting diode.

Page 14, Paragraph Beginning at Line 6

The above compound having isocyanate groups is most preferably at least one compound selected from the group consisting of diisocyanatemethylbenzene, [bis(1-isocyanato-1,1-dimethyl)benzene], bis(1-isocyanato-1-methylethyl)benzene, 4,4'-diisocyanato-dicyclohexylmethane, 1-isocyanato-3,5,5-trimethyl-3-isocyanatomethylcyclohexane and bisisocyanatomethylcyclohexane.

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Pages 21 and 22, Paragraph Beginning at Line 21

Illustrative examples of the isocyanate group-containing compound (i) having a structure in which the isocyanate groups are not directly bonded to the benzene ring include 1,3-di(isocyanatomethyl)benzene (m-XDI), 1,4-di(isocyanatomethyl)benzene (p-XDI), [1,3-bis(l-isocyanato-1,1-dimethyl)benzene] 1,3-bis(l-isocyanato-1-methylethyl)benzene (m-TMXDI), [1,4-bis(l-isocyanato-1,1-dimethyl)benzene] 1,4-bis(l-isocyanato-1-methylethyl)benzene (p-TMXDI), [1-isocyanatomethyl-3-(1-isocyanato-1,1-dimethyl)benzene], 1-isocyanatomethyl-3-(1-isocyanato-1-methylethyl)benzene, [1-isocyanatomethyl-4-(1-isocyanato-1,1-dimethyl)benzene] 1-isocyanatomethyl-4-(1-isocyanato-1-methylethyl)benzene and 1,4-di(isocyanatoethyl)benzene.

Page 27, Paragraph Beginning at Line 8

Preferable out of these isocyanates are 1,3-di(isocyanatomethyl)benzene (m-XDI), 1,4-di(isocyanatomethyl)benzene (p-XDI), [1,3-bis(l-isocyanato-1,1-dimethyl)benzene] 1,3-bis(l-isocyanato-1-methylethyl)benzene (m-TMXDI), [1,4-bis(l-isocyanato-1,1-dimethyl)benzene] 1,4-bis(l-isocyanato-1-methylethyl)benzene (p-TMXDI), 4,4'-diisocyanato-dicyclohexylmethane (HI2MDI), 1-isocyanato-3,5,5-trimethyl-3-isocyanatomethylcyclohexane (IPDI), 1,3-diisocyanatomethylcyclohexane (m-H6XDI), [1,4-diisocyanatomethylcyclohexane] 1,4-diisocyanatomethylcyclohexane (p-H6XDI) and the polycyclic alicyclic isocyanate represented by the formula [I].

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Pages 30-32, Paragraph Beginning at Line 20

Specific examples of the polyhydric alcohols having a relatively low molecular weight include dihydric alcohols such as ethylene glycol (EG), diethylene glycol (DEG), propylene glycol (PG), dipropylene glycol (DPG), 1,3-butanediol (1,3-BD), 1,4-butanediol (1,4-BD), 2,2-dimethyl-1,3-propanediol (neopentyl glycol, NPG), 1,5-pentanediol, 1,6-hexanediol, [2,2-dimethyl-1,3-propanediol] 3-methyl-1,5-pentanediol, 2-methyl-2,4-pentanediol, 2-ethyl-1,3-hexanediol, and [1,3-hydroxybenzene] 1,3-dihydroxybenzene, 1,3-bis(2-hydroxyethoxy)benzene, [4,4'-dihydroxydiphenylpropane] 2,2-bis(4-hydroxyphenyl)propane, 4,4'-dihydroxydiphenylmethane, 1,2-dihydroxycyclohexane, 1,3-dihydroxycyclohexane, 1,4-dihydroxycyclohexane, 1,2-dihydroxymethylcyclohexane, 1,3-dihydroxymethylcyclohexane, 1,4-dihydroxymethylcyclohexane, 1,2-bishydroxyethoxycyclohexane, 1,3-bishydroxyethoxycyclohexane, 1,4-bishydroxyethoxycyclohexane, 1,2-bishydroxyethoxycarbonylcyclohexane, 1,3-bishydroxyethoxycarbonylcyclohexane, 1,4-bishydroxyethoxycarbonylcyclohexane, 2,5-dihydroxymethylbicyclo[2.2.1]heptane, 2,6-dihydroxymethylbicyclo[2.2.1]heptane, 3,8-dihydroxymethyltricyclo[5.2.1.0<sup>2,6</sup>]decane, 3,9-dihydroxymethyltricyclo[5.2.1.0<sup>2,6</sup>]decane and 4,8-dihydroxymethyltricyclo[5.2.1.0<sup>2,6</sup>]decane; trihydric alcohols such as glycerine, [2-hydroxymethyl-2-methyl-1,3-diol] 2-hydroxymethyl-2-methyl-1,3-propanediol, [2-ethyl-2-hydroxymethyl-1,3-diol] 2-ethyl-2-hydroxymethyl-1,3-propanediol (TMP), 1,2,5-hexanetriol, 1,2,6-hexanetriol, 1,2,3-cyclohexanetriol and 1,3,5-cyclohexanetriol; and tetrahydric or higher polyhydric alcohols such as pentaerythritol, glucose, sucrose,

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fructose, sorbitol, 1,2,3,4-cyclohexanetetrol, 1,2,4,5-cyclohexanetetrol, cyclohexanepentol (quercitol), cyclohexanehexol (inositol), and xylitol.

Pages 35-36, Paragraph Beginning at Line 9

Specific examples of the polyhydric alcohols having a relatively low molecular weight include dihydric alcohols such as ethylene glycol (EG), diethylene glycol (DEG), propylene glycol (PG), dipropylene glycol (DPG), 1,3-butanediol (1,3-BD), 1,4-butanediol (1,4-BD), 2,2-dimethyl-1,3-propanediol (neopentyl glycol, NPG), 1,5-pentanediol, 1,6-hexanediol, [2,2-dimethyl-1,3-propanediol,] 3-methyl-1,5-pentanediol, 2-methyl-2,4-pentanediol, 2-ethyl-1,3-hexanediol and [1,3-hydroxybenzene] 1,3-dihydroxybenzene, 1,3-bis(2hydroxyethoxy)benzene, [4,4'-dihydroxydiphenylpropane] 2,2-bis(4-hydroxyphenyl)propane, 4,4'-dihydroxydiphenylmethane, 1,2-dihydroxycyclohexane, 1,3-dihydroxycyclohexane, 1,4-dihydroxycyclohexane, 1,2-dihydroxymethylcyclohexane, 1,3-dihydroxymethylcyclohexane, 1,4-dihydroxymethylcyclohexane, 1,2-bishydroxyethoxycyclohexane, 1,3-bishydroxyethoxycyclohexane, 1,4-bishydroxyethoxycyclohexane, 1,2-bishydroxyethoxycarbonylcyclohexane, 1,3-bishydroxyethoxycarbonylcyclohexane, 1,4-bishydroxyethoxycarbonylcyclohexane, 2,5-dihydroxymethylbicyclo[2.2.1]heptane, 2,6-dihydroxymethylbicyclo[2.2.1]heptane, 3,8-dihydroxymethyltricyclo[5.2.1.0<sup>2,6</sup>]decane, 3,9-dihydroxymethyltricyclo[5.2.1.0<sup>2,6</sup>]decane and 4,8-dihydroxymethyltricyclo[5.2.1.0<sup>2,6</sup>]decane; trihydric alcohols such as glycerine, [2-hydroxymethyl-2-methyl-1,3-diol] 2-hydroxymethyl-2-methyl-1,3-propanediol, [2-ethyl-2-hydroxymethyl-1,3-diol] 2-ethyl-2-hydroxymethyl-1,3-propanediol (TMP), 1,2,5-

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hexanetriol, 1,2,6-hexanetriol, 1,2,3-cyclohexanetriol and 1,3,5-cyclohexanetriol; and tetrahydric or higher polyhydric alcohols such as pentaerythritol, glucose, sucrose, fructose, sorbitol, 1,2,3,4-cyclohexanetetrol, 1,2,4,5-cyclohexanetetrol, cyclohexanepentol (quercitol), cyclohexanexol (inositol), xylitol, dipentaerythritol and diglycerine.

Page 59, Paragraph Beginning at Line 11

100.0 Grams of NBDI was charged into a stainless cup. While the NBDI was stirred by stirrer, 62.3 g of a polyol (to be referred to as "polyol B" hereinafter) which is obtained by adding propylene oxide (to be referred to as "PO" hereinafter) to 1 mole of [2-ethyl-2-hydroxymethyl-1,3-diol] 2-ethyl-2-hydroxymethyl-1,3-propanediol (to be referred to as "TMP" hereinafter) and which has a hydroxyl value of 874 mgKOH/g and a residual potassium amount of 0.9 ppm was added to the NBDI without taking in bubbles, and they were stirred and mixed for 10 minutes to be dissolved homogeneously. The homogeneous solution was transferred into a mold having a size of 50 mm x 50 mm, allowed to react in an oven heated to 100°C in a nitrogen gas atmosphere for 5 hours and then after-cured at 150°C for 3 hours to obtain a colorless, transparent polyurethane resin.

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**Marked-up Claims 3, 4, 7-9, and 12-17**

3. (Amended) The resin according to claim 1 [or 2], wherein the content of sulfur atoms is 500 ppm or less.
4. (Amended) The resin according to [any one of claims 1 to 3] claim 1, wherein the content of alkali metal atoms is 10 ppm or less.
7. (Amended) The composition according to claim 5 [or 6], wherein an initial mixing viscosity at the time of mixing the component (A) and the component (B) together at 20' C is in a range of 10 to 10,000 mPa·s.
8. (Amended) The composition according to [any one of claims 5 to 7] claim 5, wherein a time required for a viscosity after mixing of the component (A) and the component (B) to become twice as much as the initial mixing viscosity is in a range of 2 to 20 hours.
9. (Amended) The composition according to [any one of claims 5 to 8] claim 5, wherein the compound having isocyanate groups is a polycyclic alicyclic polyisocyanate or its modification.
12. (Amended) The composition according to claim 5, wherein the compound having isocyanate groups is at least one compound selected from the group consisting of diisocyanatomethylbenzene, [bis(1-isocyanato-1,1-dimethyl)benzene] bis(1-isocyanato-1,1-

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**Marked-up Claims 3, 4, 7-9, and 12-17**

methylethyl)benzene, 4,4'-diisocyanato-dicyclohexylmethane, 1-isocyanato-3,5,5-trimethyl-3-isocyanatomethylcyclohexane and bisisocyanatomethylcyclohexane.

13. (Amended) The composition according to [any one of claims 5 to 12] claim 5, wherein the compound having hydroxyl groups is a compound having at least two hydroxyl groups.

14. (Amended) The composition according to claim [12 or] 13, wherein the content of alkali metal atoms in the compound having at least two hydroxyl groups is 10 ppm or less.

15. (Amended) The composition according to [any one of claims 5 to 14] claim 5, which has a glass transition temperature of at least 75°C after cured.

16. (Amended) The composition according to [any one of claims 5 to 15] claim 5, which has a refractive index of 1.45 to 1.80 as measured by using a D line from a helium light source after cured.

17. (Amended) The composition according to claim 5 [or 16],  
which has  
a  $\Delta E$  of 1.5 or less as measured after irradiation for 600 hours by a sunshine  
weatherometer using a carbon arc lamp after cured,

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**Marked-up Claims 3, 4, 7-9, and 12-17**

a  $\Delta E$  of 1.5 or less after treating for 300 hours in a thermostatic chamber having a relative humidity of 90% and a temperature of 80°C,

a content of sulfur atoms of 500 ppm or less, and

a content of alkali metal atoms of 10 ppm or less.

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